

PLANT PARASITIC NEMATODES ASSOCIATED WITH POTATO PLANT IN THOUBAL DISTRICT OF MANIPUR

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ABSTRACT

An investigation was conducted in 16 different localities of Thoubal district in Manipur to ascertain the plant parasitic nematode genera associated with potato plant during growing seasons from January to June, 2016. A total number of 160 soil and root samples were collected and examined thoroughly following standardised procedures and techniques. Six plant parasitic nematode genera namely Meloidogyne spp., Rotylenchulus spp., Helicotylenchus spp., Tylenchorhynchus spp., Pratylenchus spp. and Aglenchus spp. were encountered, out of which the dominating nematode genera showing highest absolute density was Meloidogyne spp. followed by Rotylenchulus spp. and the lowest absolute density was shown by Aglenchus spp.

KEY WORDS: Potato, Plant Parasitic Nematodes, Meloidogyne Spp., Thoubal and Manipur

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INTRODUCTION

Potato is a major food crop grown in more than 100 countries in the world. At present, China, Russia, India, Poland and U.S.A. contribute a major share of total world production. It was introduced in India by the Portuguese sailors. Potato is one of main commercial crop grown in the country. It is cultivated in 23 states in India. However, in Manipur its production rate seems to quite lesser in comparison to the other states, the reason behind it may be soil texture, environmental threats or attack by plant parasitic nematodes.

Roots of most plant species are usually infected by one or more plant parasitic nematodes. Most of these plant parasitic nematodes are too small to be seen with the naked eye. Under favourable environmental conditions and suitable hosts, populations of nematode can build up to cause economic crop loss. The symptoms caused by them cannot be easily diagnosed in the field alone; these symptoms may be confused with other diseases, pests, nutritional or environmental factors. To diagnose nematode damage, it is usually necessary to test soil or plant material to get an accurate estimate of nematode numbers in the field and also to design an appropriate management strategy, information is required on its dynamics and the extent of yield loss the nematode may cause.

MATERIALS AND METHODS

The present study was conducted to identify the frequently encountered plant parasitic nematode genera on potato in 16 different localities of Thoubal district of Manipur viz. Khékman, Sangaiyumpham, Uchiwa, Wabagai, Khangabok, Serou, Phundrei, Kakmayai, Heirok, Hiyanglam, Tentha, Thounaojam, Irongchesaba, Khoirom, Ichamkhunou and Mantak. Several potato fields on which symptoms such as wilting, slow growth,

stunting and yellowing of leaves were observed have been randomly surveyed. Soil samples from the rhizospheric regions were collected from a depth of 10-15 cm. A minimum of 10 Root and soil sub samples each were collected from each field and were stored in polythene bags in the laboratory for processing. The root samples and tubers were washed with tap water and the processing of the soil samples were done following the extraction of nematodes by Cobb's sieving and decanting method followed by Baermann's funnel method (Southey, 1986). Altogether, 160 soil samples and roots were collected from different fields. Infected roots were stained in Cotton Blue-lactophenol and examined for the presence of nematodes. The females of root knot nematodes were dissected out from the galled roots and perineal section were also prepared for species identification. The estimation of nematode population per 10g root samples and 200g soil sample was done in a multi-chambered counting dish under a stereoscopic binocular microscope. The population densities of nematode species in the samples were calculated using the formulae (Norton, 1978).

$$\text{Absolute frequency} = \frac{\text{No. of samples containing a species}}{\text{No. of samples collected}} \times 100$$

$$\text{Relative frequency} = \frac{\text{Frequency of a species}}{\text{Sum of frequencies of all species}} \times 100$$

$$\text{Absolute density} = \frac{\text{No. of individuals of a species in a sample}}{\text{Volume or mass or units of the sample}} \times 100$$

RESULTS AND DISCUSSIONS

The table 1 shows the distribution of plant parasitic nematode population/200 cm³ associated with Potato plant in 16 different localities of Thoubal district in Manipur. An analysis of nematode communities is also shown in Table 2 and revealed the presence of 6 genera of plant parasitic nematodes. The most frequently occurring nematode was *Meloidogyne* spp. having an absolute frequency of 8.12%, followed by *Helicotylenchus* spp. with 6.25% and *Rotylenchulus* spp. with 5%. The lowest absolute frequency was recorded in *Tylenchorhynchus* spp. with 1.87%. Likewise, the Relative frequency was recorded highest in *Meloidogyne* spp. with 31.7% followed by *Helicotylenchus* spp. with 24.39% and *Rotylenchulus* spp. with 19.51%, the lowest being recorded in *Tylenchorhynchus* spp. with 7.31% The present investigation tallies with the relevant works of Sahu et al. 2011, Srinivasan et al. 2011, Joymati et al. 2011, Joymati & Thoithoi, 2010. Earlier researcher like Cobb (1918) and others who developed reliable sampling extraction procedure for nematode communities formed the bases for improved control practices. Earliest quantitative studies in nematode sampling were conducted by Anscombe (1950) on potato cyst nematode.

CONCLUSIONS

Investigations have revealed that nematode populations and communities change over time with the maximum numbers usually occurring near harvest for annual crops. According to Seinhorst (1959), measurable damage occurs only when population density exceeds certain limit. Nematode density increase and subsequent reduction in yield or other pathogenic effects are directly influenced by the initial density of nematodes in soil (Wallace, 1972).

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APPENDICES

Table 1: Distribution of Plant Parasitic Nematodes Associated with Potato Plant in 16 Different Localities of Thoubal District In Manipur (Nematode Population /200 cm³)

Sl. No.	Localities	<i>Meloidogyne</i> spp.	<i>Rotylenchulus</i> spp.	<i>Helicotylenchus</i> spp.	<i>Tylenchorhynchus</i> spp.	<i>Pratylenchus</i> spp.	<i>Aglenchus</i> spp.
1	Khekman	6686	431	212	—	34	-
2	Sangaiyumpham	312	—	564	—	-	-
3	Uchiwa	212	5432	86	—	-	31
4	Wabagai	4332	—	—	94	-	-
5	Khangabok	3140	4310	861	—	-	-
6	Serou	—	—	453	—	48	-
7	Phundrei	4658	—	—	—	-	11
8	Kakmayai	—	311	—	18	-	-
9	Heirol	3412	654	22	—	25	-
10	Hiyanglam	—	439	—	—	-	-
11	Tentha	7654	—	574	—	-	23
12	Thounaojam	8654	3653	434	62	13	-
13	Ironghesaba	231	—	986	—	-	22
14	Khoirom	211	—	432	—	-	-
15	Ichamkhunou	432	—	—	—	24	—
16	Mantak	34	22	—	—	7	—

Table 2: Community Analysis of Plant Parasitic Nematodes in 16 Different Localities of Thoubal District in Manipur

Sl. No.	Nematode	Absolute Frequency	Absolute Density	Relative Frequency
1	<i>Meloidogyne</i> spp.	8.12	1332.26	31.70
2	<i>Rotylenchulus</i> spp.	5.0	508.4	19.51
3	<i>Helicotylenchus</i> spp.	6.25	154.13	24.39
4	<i>Tylenchorhynchus</i> spp.	1.87	5.8	7.31
5	<i>Pratylenchus</i> spp.	3.75	5.03	14.63
6	<i>Aglenchus</i> spp.	2.5	2.9	9.75